PB87-129763

Siting Criteria for Regionally Located Wet Deposition Collection Sites

Research Triangle Inst.
Research Trangle Park, NC

Prepared for

Environmental Monitoring Systems Lab.
Research Triangle Park, NC

Dec 86

U.S. Department of Commerce
National Technical Information Service
NTIS

PB87-129763

EPA/600/4-86/035
December 1986

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Under EPA Contract No. 68-02-4125
Work Assignment No. 104

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U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL
INFORMATION SERVICE
SPRINGFIELD, VA. 22161

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO. EPA/600/4-86/035	2.
3. RECIPIENT'S ACCESSION NO. PB87 129763/AS	
4. TITLE AND SUBTITLE SITING CRITERIA FOR REGIONALLY LOCATED WET DEPOSITION COLLECTION SITES	5. REPORT DATE December 1986 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) W.C. Eaton and E.L. Tew	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Research Triangle Institute Research Triangle Park, NC 27709	10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO. 68-02-4125
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency Office of Research and Development Environmental Monitoring Systems Laboratory Quality Assurance Division (MD-77B) Research Triangle Park, NC 27711	13. TYPE OF REPORT AND PERIOD COVERED Guidance Document 14. SPONSORING AGENCY CODE EPA/600/08
15. SUPPLEMENTARY NOTES	

16. ABSTRACT

This report provides a listing of siting criteria that can be used in selecting sites for wet deposition measurements in rural areas. The criteria are grouped into three categories which address influences on the sample collection from the point of view of (1) nearby site influences, (2) local influences and (3) regional influences.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group

18. DISTRIBUTION STATEMENT RELEASE TO PUBLIC	19. SECURITY CLASS (This Report) UNCLASSIFIED	21. NO. OF PAGES 9
	20. SECURITY CLASS (This page) UNCLASSIFIED	22. PRICE

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

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SITING CRITERIA FOR REGIONALLY LOCATED WET DEPOSITION COLLECTION SITES

This report contains a list of siting criteria to be used in selecting or evaluating regionally located precipitation collection sites in rural regions of the State-Operated Network. For purposes of this discussion, a regionally located site is characterized as one located in a rural area, at least 5 km distant from urban centers of 10,000 inhabitants, and at least 10 km distant from major industrial sources or urban centers of 75,000 inhabitants. A companion report (1) lists criteria for sites which are, by design or necessity, urban-influenced or are purposefully located within urban areas[1].

The general objective of a regionally located site is to obtain precipitation data that is representative of a large geographic area and from this data identify long-term temporal and spatial variations in the chemical nature of precipitation.

The criteria are grouped in three categories which address influences on the sample collection from the point of view of (1) nearby site influences, (2) local influences, and (3) regional influences. Information contained in the criteria is primarily based on that given in four documents: the EPA "Quality Assurance Handbook for Air Pollution Measurement Systems," Volume I, Principles[2] the EPA "Quality Assurance Manual for Precipitation Measurement Systems"[3]; the U.S. Geological Survey document, "Design of the National Trends Network for Monitoring the Chemistry of Acid Precipitation"[4]; and the "NADP Instruction Manual: NADP/NTN Site Selection and Installation"[5].

The siting criteria may be used to evaluate the suitability of an existing or candidate wet-only regionally representative precipitation collection site in terms of:

- o type and height of groundcover in the immediate vicinity of the location of the sampling equipment (important to avoid sample contamination from the soil and plants);
- o distance of the sample collection equipment from obstructions (important to avoid sample contamination and variation in sample catch efficiency);
- o distance of the sample collection equipment from nearby and distant sources of contamination and pollution (important to avoid undue source influences on the sample's constituent concentrations which, if present, make the sample less representative of the region);
- o human or animal activities in the vicinity of the collection site (important to avoid sample contamination); and

- o topographic, hydrologic, and orographic features of the land surrounding the site (important for regional representativeness, catch efficiency, avoidance of sample contamination, and desirable collector sensor operation).

This section on siting criteria for rural wet deposition collection sites is to be used in quality assurance studies of State-Operated Network sites, as discussed in the work plan for this effort.[6]

REFERENCES

1. Eaton, W. C., and E. L. Tew. Siting Criteria for Urban Influenced Wet Deposition Sites. Report to EMSL/EPA-RTP under Contract No. 68-02-4125, Work Assignment No. 124, January 1986.

2. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume I, Principles. EPA-600/9-76-005.

3. Topol, L. E., et al. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume V - Manual for Precipitation Measurement Systems, U. S. Environmental Protection Agency Publication No. EPA/4-82-042b, March 1983.

4. Robertson, J. K. and J. W. Wilson. Design of the National Trends Network for Monitoring the Chemistry of Atmospheric Precipitation. U. S. Geological Survey Circular 694, 1985.

5. Bigelow, D. S. NADP Instruction Manual: NADP/NTN Site Selection and Installation. National Atmospheric Deposition Program Coordinator's Office, Colorado State University, Fort Colllins, Colorado, July 1984.

6. Eaton, W. C. Work Plan for Quality Assurance Assistance to New and Existing Acid Precipitation Collection Sites in the State-Operated Network. Report to EMSL/EPA-RTP under Contract No. 68-02-4125, Work Assignment No. 42, October 1985.

REGIONAL SITING CRITERIA

SITE INFLUENCES

1. The steepest slope of the ground within 30 meters (98 ft.) the collector and rain gauge should be less than 20 degrees and will be less than or equal to slopes typical of the regional terrain unless the site is on a hilltop. The slope should then be less than 30 degrees. Ideally, the slopes should be less than 5 degrees. The collector and rain gauge should be mounted at ground level or on platforms of small surface area and of height generally no more than 1 m (3.3 ft.). The openings of the collector and gauge should be level and at the same height above ground within 0.5 m (1.6 ft.). The separation distance between collector and gauge should be at least 5 m (16.4 ft.) and no more than 30 m (98 ft.) unless they are mounted on a platform as is required in high snowfall areas.

2. The distance to collocated equipment should be at least 5 m (16 ft.).

3. Surrounding vegetation within 500 m (1640 ft.) of the site should be typical of vegetation in the region. The height of ground cover should be no higher than 0.6 m (2 ft.) within a circle of 10 m (33 ft.) radius surrounding the collector.

4. In a forest setting, the site should be located in a clearing at least 30 m (98 ft.) from the woodline. In no case, should the angle of projection of a tree onto the collector or rain gauge rim be greater than 45 degrees.

5. The distance from the collector to the nearest solid structure (house, shed, wall, etc.) should be great enough so that the object occupies less than 30 degrees arc as viewed from the collector. The angle of projection from the top of a solid structure should not exceed 15 degrees.

6. The distance from the site to the nearest grazing domesticated animals should be at least 20 m (66 ft.).

7. The distance from the site to the nearest cultivated field should be at least 20 m (66 ft.).

LOCAL INFLUENCES

8. The distance from the site to the nearest source, such as a landfill or sewage treatment facility, should be at least 100 m (328 ft.).

9. The distance from the site to open surface storage of agricultural products, fuels, or vehicles should be at least 100 m (328 ft.).

10. The distance from the site to sources of fugitive dust (such as a cement plant or granary should be at least 500 m (1,640 ft.).

11. The distance from the site to the nearest large concentration of animals, such as dairy feedlots, should be at least 500 m (1,640 ft.).

12. The nearest parking lot containing fewer than 10 vehicles, and where traffic movement is limited to a few brief episodes daily (people coming to and leaving work) should be at least 75 m (246 ft.) from the collector.

13. The nearest large parking area (> 20 vehicles), smaller parking area with frequent use, or vehicle and equipment service area should be at least 100 m (328 ft.) from the collector.

14. The nearest regularly traveled road carrying less than 30 vehicles/hr (24 hr. average) should be at least 50 m (164 ft.) from the collector. A driveway or jeep trail, traveled only to reach the site, is an exception; however, it should be no nearer than 10 m (33 ft.) to the collector.

15. The distance from the site to the nearest state or secondary road carrying over 30 vehicles/hr should be at least 100 m (328 ft.).

REGIONAL INFLUENCES

16. The distance from the collector to oceans or saltwater bodies which may contribute significant salt spray should be at least 2 km (1.2 mi.).

17. The distance from the site to the nearest small community (100-1000 pop.) should be at least 0.75 km (0.5 mi).

18. The distance from the site to the nearest urban area (1,000-10,000 pop.) should be at least 1 km (0.6 mi).

19. The distance from the site to the nearest urban area (10,000-75,000 pop.) should be at least 5 km (3 mi).

20. The distance from the site to the nearest urban area (> 75,000 pop.) should be at least 20 km (12 mi).

21. The distance from the site to the nearest major industrial source such as a coal or oil burning power plant, foundry, chemical plant, etc., should be at least 10 km (6 mi).

22. The distance from the site to the nearest interstate highway, major thoroughfare, major airport, or railroad complex should be at least 2 km (1.2 mi).